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# मानक

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IS 8510-1 to 3 (1977): Tinned steel wire for banding of armatures and rotors [MTD 4: Wrought Steel Products]



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IS : 8510 ( Parts I to III ) - 1977

*Indian Standard*

SPECIFICATION FOR  
TINNED STEEL WIRE FOR BANDING OF  
ARMATURES AND ROTORS



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**INDIAN STANDARDS INSTITUTION**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

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AMENDMENT NO. 1 AUGUST 1985

TO

IS:8510(Parts 1 to 3)-1977 SPECIFICATION FOR TINNED  
STEEL WIRE FOR BANDING OF ARMATURES AND ROTORS

Alterations

IS:8510(Part 1)-1977 PART 1 GENERAL REQUIREMENTS

(Page 4, clause 8.1) - Substitute the following  
for the existing matter:

'8.1 Unless otherwise agreed to, the method of drawing  
representative samples of the material and the criteria  
for conformity shall be as specified in IS:10206-1982<sup>5</sup>.'

(Page 4) - Add the following foot-note at the  
bottom of the page:

'<sup>5</sup>Methods of sampling steel wires.'

(Pages 5 and 6, APPENDIX A) - Delete.

IS:8510(Part 2)-1977 PART 2 SPECIFIC REQUIREMENTS  
FOR MAGNETIC BANDING WIRES

(Page 7, clause 3.1, first three lines) -  
Substitute the following for the existing matter:

'3.1 The ladle analysis of steel for the wire, when  
analysed either by the method specified in the relevant  
parts of IS:228\* or any other established instrumental/  
chemical method shall conform to the requirements  
specified below. In case of dispute, the procedure  
given in IS:228\* and its relevant parts shall be the  
referee method.'

**IS:8510(Part 3)-1977 PART 3 SPECIFIC REQUIREMENTS  
FOR NON-MAGNETIC BANDING WIRES**

*(Page 9, clause 3.1, first three lines) -*  
**Substitute the following for the existing matter:**

**'3.1 The ladle analysis of steel for the wire, when analysed either by the method specified in the relevant parts of IS:228\* or any other established instrumental/chemical method shall conform to the requirements specified below. In case of dispute, the procedure given in IS:228\* and its relevant parts shall be the referee method.'**

**(SMDC 5)**

# *Indian Standard*

## SPECIFICATION FOR TINNED STEEL WIRE FOR BANDING OF ARMATURES AND ROTORS

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( Continued on page 2 )

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*Indian Standard*  
**SPECIFICATION FOR  
TINNED STEEL WIRE FOR BANDING OF  
ARMATURES AND ROTORS  
PART I GENERAL REQUIREMENTS**

UDC 669·14-426 : 669·68 : 621·3·043

**0. FOREWORD**

**0.1** This Indian Standard ( Part I ) was adopted by the Indian Standards Institution on 27 July 1977, after the draft finalized by the Wrought Steel Products Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** This standard has been prepared with a view to guiding the industry with regard to the use of tinned steel wires for banding of armatures and rotors.

**0.3** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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**1. SCOPE**

**1.1** This standard ( Part I ) covers the general requirements for tinned round steel wires for banding of armatures and rotors.

**1.2** The specific requirements for magnetic and non-magnetic banding wires are given in Part II and Part III, respectively.

**2. TERMINOLOGY**

**2.1** For the purpose of this standard, the definitions given in IS: 1956 ( Part V )-1976† shall apply.

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\*Rules for rounding off numerical values ( *revised* ).

†Glossary of terms relating to iron and steel: Part V Bright steel bar and steel wire ( *first revision* ).

## **IS: 8510 ( Part I ) - 1977**

### **3. SUPPLY OF MATERIAL**

**3.1** General requirements relating to the supply of steel wires shall be as laid down in IS : 1387-1967

### **4. MANUFACTURE**

**4.1** The wire shall be drawn from steel manufactured by open-hearth, electric, duplex, basic-oxygen or a combination of these processes. In case any other process is employed by the manufacturer, prior approval of the purchaser shall be obtained.

### **5. GRADES**

**5.1** This standard covers the following categories of steel wires for banding:

- a) Magnetic banding wire, and
- b) Non-magnetic banding wire.

### **6. SIZES AND TOLERANCES**

**6.1** The nominal sizes shall be as agreed to between the manufacturer and the purchaser and the tolerance on diameter shall be  $\pm 2.0$  percent of nominal diameter with a minimum of  $\pm 0.025$  mm.

### **7. TESTS**

**7.1 Tensile Test** — The tensile strength of wire shall be tested in accordance with the procedure laid down in IS : 1521-1972†.

**7.1.1** The requirements for tensile strength and proof stress shall be as specified in Part II and Part III.

**7.2 Wrapping Test** — The wrapping test shall be carried out in accordance with the procedure laid down in IS : 1755-1961‡.

**7.2.1** The details of requirements for wrapping test shall be as specified in Part II and Part III.

**7.3 Coating Test** — The tin coating test for the wires shall be subject to mutual agreement between the purchaser and the manufacturer.

### **8. SAMPLING**

**8.1** Unless otherwise agreed to, the method of drawing representative samples of the material and the criteria for conformity shall be as prescribed in Appendix A.

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\*General requirements for the supply of metallurgical materials ( *first revision* ).

†Method for tensile testing of steel wire ( *first revision* ).

‡Method for wrapping test of wire.

## **9. FREEDOM FROM DEFECTS**

**9.1** All finished wires shall be well and cleanly drawn to the dimensions specified. The wire shall be sound; free from splits; surface flaws; rough/jagged and imperfect edges and other harmful surface defects.

## **10. PACKING**

**10.1** Each coil of wire shall be suitably bound and fastened compactly. If required by purchaser, each coil shall be protected by suitable wrapping.

## **11. MARKING**

**11.1** Each coil of wire shall be legibly marked with the finish, size of the wire, lot number and trade-mark or the name of the manufacturer.

**11.1.1** The material may also be marked with the ISI Certification Mark.

**NOTE** — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

# **A P P E N D I X   A**

*( Clause 8.1 )*

## **SAMPLING AND CRITERIA FOR CONFORMITY**

### **A-1. LOT**

**A-1.1** In any consignment, all the coils of wire of the same grade and diameter manufactured under essentially similar conditions of manufacture, shall be grouped together to constitute a lot.

**A-1.1.1** Samples shall be taken from each lot and tested for conformity to the standard.

### **A-2. SAMPLING**

**A-2.1** The number of coils to be taken from a lot shall be according to col 1 and 2 of Table 1. These samples shall be taken at random by using random number tables ( *see* IS : 4905-1968\* ).

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\*Methods for random sampling.

**TABLE 1 SCALE OF SAMPLING AND PERMISSIBLE NUMBER OF DEFECTIVES**

( Clause A-2.1 )

No. of COILS IN A LOT	No. of COILS FOR PHYSICAL REQUIREMENTS	PERMISSIBLE No. OF DEFECTIVES	No. of TESTS FOR CHEMICAL REQUIREMENTS
(1)	(2)	(3)	(4)
Up to 25	8	0	2
26 „ 50	13	1	3
51 „ 150	20	2	5
151 „ 300	32	3	8
301 and above	50	5	8

**A-3. PREPARATION OF SAMPLES AND NUMBER OF TESTS**

**A-3.1 Tests for Physical Requirements** — From the coils selected according to col 1 and 2 of Table 1, adequate length of test piece shall be cut from each end and subjected to physical tests, namely, size, surface condition, tensile, bend, wrapping and coating tests. A test piece failing to meet any one of the requirements, shall be called a defective. If the number of defectives found is less than the number of permissible number of defectives specified in col 3 of Table 1, the lot shall be considered to have conformed to physical requirements, otherwise not.

**A-3.2 Tests for Chemical Requirement** — Unless otherwise agreed, the following procedure shall be followed for chemical requirements:

From those test pieces which have conformed to physical requirements, further test pieces shall be selected at random according to col 4 of Table 1. These samples shall be tested for all the chemical requirements. If a test piece fails to meet the respective chemical requirement, it shall be called a defective. The lot shall be considered to have conformed to the chemical requirements if all the individual test pieces tested for chemical requirements pass the test, otherwise not.

**A-4. CRITERIA FOR CONFORMITY**

**A-4.1** A lot shall be considered to have conformed to the requirements of the specification if **A-3.1** and **A-3.2** are satisfied.

*Indian Standard*  
**SPECIFICATION FOR  
TINNED STEEL WIRE FOR BANDING OF  
ARMATURES AND ROTORS**

**PART II SPECIFIC REQUIREMENTS FOR  
MAGNETIC BANDING WIRES**

UDC 669·14·018·5-426 : 669·68 : 621·3·043

**1. SCOPE**

**1.1** This standard ( Part II ) lays down the requirements for chemical composition and mechanical properties for magnetic banding wires.

**2. GENERAL REQUIREMENTS**

**2.1** The general requirements for manufacture, sizes, tolerances, tests, freedom from defects, packing and marking shall conform to those given in Part I.

**3. CHEMICAL COMPOSITION**

**3.1** The ladle analysis of steel for the wire when analyzed in accordance with the relevant parts of IS : 228\* shall conform to the requirements specified below:

<i>Constituents</i>	<i>Percent</i>
Carbon	0·60-0·85
Manganese	0·50-0·80
Silicon	0·10-0·35
Phosphorus, <i>Max</i>	0·040
Sulphur, <i>Max</i>	0·040

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\*Method of chemical analysis of steels ( *second revision* being issued in parts ).

## **IS:8510 ( Part II ) - 1977**

**3.2 Product Analysis** — The permissible variation in case of product analysis from the limits specified in 3.1 shall be as given below:

<i>Constituents</i>	<i>Permissible Variation, Percent</i>
Carbon	$\pm 0.04$
Manganese	$\pm 0.04$
Silicon	$\pm 0.03$
Sulphur	$+0.005$
Phosphorus	$+0.005$

NOTE — Variations shall not be applicable both over and under the specified limits in several determinations in a heat.

## **4. TESTS**

**4.1 Tensile Test** — The tensile strength of all wires when tested in accordance with IS : 1521-1972\* shall be 1 760 N/mm<sup>2</sup> *Min* ( 180 kgf/mm<sup>2</sup> *Min* ).

**4.2 Proof Stress** — The proof stress at 0.2 percent permanent elongation of this wire shall be 1 280 N/mm<sup>2</sup> *Min* ( 130 kgf/mm<sup>2</sup> *Min* ). Alternatively the stress at 1 percent elongation of this wire shall be 1 280 N/mm<sup>2</sup> *Min* ( 130 kgf/mm<sup>2</sup> *Min* ).

**4.3 Wrapping Test** — After tightly wrapping for 8 complete turns around an arbour of 3 times the diameter, the wire shall not show cracking or splitting.

## **5. SURFACE COATING**

**5.1** The wire shall be smoothly coated with tin so as to facilitate soldering. The amount of coating may be agreed between the purchaser and the manufacturer.

## **6. SAMPLING**

**6.1** The requirement for sampling and the criteria for conformity shall conform to those given in Part I of this standard.

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\*Method for tensile testing of steel wire (*first revision* ).

*Indian Standard*SPECIFICATION FOR  
TINNED STEEL WIRE FOR BANDING OF  
ARMATURES AND ROTORSPART III SPECIFIC REQUIREMENTS FOR  
NON-MAGNETIC BANDING WIRES

UDC 669·14·018·584·426 : 669·68 : 621·3·043

**1. SCOPE**

1.1 This standard ( Part III ) lays down the requirements for chemical composition and mechanical properties for non-magnetic banding wires.

**2. GENERAL REQUIREMENTS**

2.1 The general requirements for manufacture, sizes, tolerances, tests, freedom from defects, and packing and marking shall conform to those given in Part I.

**3. CHEMICAL COMPOSITION**

3.1 The ladle analysis of steel for the wire when analyzed in accordance with the relevant parts of IS: 228\* shall conform to the requirements specified below:

<i>Constituents</i>	<i>Percent</i>
Carbon, <i>Max</i>	0·15
Manganese, <i>Max</i>	2·0
Silicon, <i>Max</i>	1·0
Phosphorus, <i>Max</i>	0·045
Sulphur, <i>Max</i>	0·035
Nickel	8·0 to 12·0
Chromium	17·0 to 20·0

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\*Method of chemical analysis of steels ( *second revision* being issued in parts ).

## IS : 8510 ( Part III ) - 1977

**3.2 Product Analysis** — The permissible variation in case of product analysis from the limits specified in 3.1 shall be as given below:

<i>Constituents</i>	<i>Permissible Variation, Percent</i>
Carbon	+0.02
Manganese	+0.1
Silicon	+0.04
Phosphorus	+0.005
Sulphur	+0.005
Nickel	±0.15
Chromium	±0.25

NOTE — Variations shall not be applicable both over and under the specified limits in several determinations in a heat.

## 4. TESTS

**4.1 Tensile Test** — The tensile strength of all wires when tested in accordance with IS : 1521-1972\* shall be 1 620 N/mm<sup>2</sup> *Min* ( 165 kgf/mm<sup>2</sup> *Min* ).

**4.2 Proof Stress** — The proof stress at 0.2 percent permanent elongation on this wire shall be 1 080 N/mm<sup>2</sup> *Min* ( 110 kgf/mm<sup>2</sup> *Min* ). Alternatively the stress at 1 percent elongation of this wire shall be 1 080 N/mm<sup>2</sup> *Min* ( 110 kgf/mm<sup>2</sup> *Min* ).

**4.3 Wrapping Test** — After tightly wrapping for 8 complete turns around an arbour of 3 times the diameter, the wire shall not show cracking or splitting.

## 5. SURFACE COATING

**5.1** The wire shall be smoothly coated with tin so as to facilitate soldering. The amount of coating may be agreed between the purchaser and the manufacturer.

## 6. SAMPLING

**6.1** The requirement for sampling and the criteria for conformity shall conform to those given in Part I of this standard.

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\*Method for tensile testing of steel wire (*first revision* ).



# INTERNATIONAL SYSTEM OF UNITS ( SI UNITS )

## Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

## Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

## Derived Units

Quantity	Unit	Symbol	Conversion
Force	newton	N	1 N = 1 kg.1 m/s <sup>2</sup>
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m <sup>2</sup>
Frequency	hertz	Hz	1 Hz = 1 c/s ( s <sup>-1</sup> )
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m <sup>2</sup>

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